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Reference Letters	Children	Mother Father	Nature of Mating	Mother's Mother Father's Mother	Mother's Father Father's Father
Va.	1 Gray	Gray (blue) Blue	DR $\times$ R	Br (gray?) Blue	Violet Blue
Vo.	1 Blue 2 Gray	Blue Gray (blue?)	DR $\times$ R	Br (blue?) Gray	Blue Br (blue?)
Wal.	1 Gray	Gray Blue	D $\times$ R	"Blue" Blue	"Blue" Blk (blue?)
War.	1 Blue 1 Br	Dk Br (blue) Blue	DR $\times$ R	Dk Br Blue	Blue Blue

Abbreviations: Br, brown; Dk Br, dark brown; Blk, black; D, dominant; DR, dominant and recessive (heterozygous); R, recessive.

Colors in parentheses are recessive; without a ? means observed, with a ? means hypothetical. Quotation marks means doubt if the term is used with precision. Double query, doubt as to correctness of color assigned.

It remains to consider the behavior of gray in inheritance. Upon tabulating the crosses of blue with gray we find that gray dominates over blue. This is true, for example, in the Al., Bu., He., Lu., McC., Ri., Va. and Wal. pedigrees given in the Appendix. In families where blue  $\times$  gray parents have a blue-eyed child (Br., Oa., Vo. families) the gray is doubtless heterogametous, containing recessive blue. Again, when both parents are gray-eyed they have produced 9 gray-eyed to 2 blue-eyed children—indicating that both grays are DR (containing recessive blue) expectation being three gray to one blue. Consequently, gray or partial pigmentation is dominant over the pigmentless blue and the occasional enumeration (Ma. family) of descendant of two blue-eyed parents as "blue-gray" or "gray" is due to a slight inaccuracy of classification. On the other hand, gray is recessive to brown (La. family), i. e., a slight pigmentation to an extensive one.

The facts brought out by these statistics show, first, that there are two principal classes of eye-color—brown and blue: that brown varies in intensity from black to light brown; that blue or absence of pigment varies from pale to deep; that blue is frequently imperfect owing to the presence of specks or patches of pigment—the "gray" or "hazel" color; that blue is recessive to gray and gray is recessive to brown.

The practical applications of these results

to human marriage are as follows: Two blue-eyed parents will have only blue-eyed children; two gray-eyed parents will have only blue-eyed and gray-eyed but not brown- or black-eyed children; brown-eyed parents may have children with any of the colors of eyes. Gray and blue-eyed parents will tend to have either gray-eyed children only or an equal number of gray- and of blue-eyed children according as the gray-eyed parent is homozygous or heterozygous. When one parent has blue eyes and the other brown the children will be all brown-eyed, if the brown-eyed parent is homozygous—otherwise they will have eyes of various colors according to the gametic constitution of the brown-eyed parent. In case one parent has gray eyes and the other brown we may have the following cases in the offspring: all of them brown-eyed (dark parent homozygous); 50 per cent. gray and 50 per cent. brown (brown parent heterozygous in gray or blue); 25 per cent. blue, 25 per cent. gray and 50 per cent. brown (both parents containing recessive blue germ-cells).

GERTRUDE C. DAVENPORT  
CHARLES B. DAVENPORT

#### THE NOMENCLATURE OF DEXTRAL, SINISTRAL AND ATTENTIONAL ORGANS AND FUNCTIONS

In the *Popular Science Monthly*, August, 1904 (republished in *Biographic Clinics*, Vol. III.), I made some suggestions as to the nomenclature of the organs and functions

pertaining to right-handedness, left-handedness, etc. After a more extended study and experience of the subject I recognize that I made some errors and more omissions, and these I may now correct. The terms *right-handed* and *left-handed* are so firmly fixed in the language, and so recognized as expressing the unconscious choice and superior expertness of one or the other hand for certain tasks, that it is useless to attempt putting them aside for more accurate words. Established usage and habit make language and govern the world. "Right-handed," "left-handed," etc., imply nothing of expertness, etc., literally, but usage has put such meanings into them. Terms merely localizing the organs without added significance must therefore be devised, *e. g.*, *dextral*, *sinistral*, *dextromanual*, *dextrocular*, and all the rest. To extend the idea of expertness to the corresponding organs, *right-eyed*, *left-eyed*, *right-footed*, *right-eared*, etc., may be used after the analogy of *right-handed*. The words *ambidextral* and *ambidexterity* should never be used by sensible persons. No one has yet existed with two dextral hands; no left-handed person has ever been trained to have an equal proficiency or expertness of each hand for all tasks; it would be most undesirable and wasteful of life to have such equal expertness; all or most such attempted training results in unhappiness, confusion, inexpertness and disease; the right-handed, according to the crazy theory, should be trained to an equal and ludicrous sinistromanual expertness, etc. The violinist should bow or finger equally expertly with each hand; the pianist play upon a reversed keyboard, the base notes to the right, half the time; soldiers should carry their guns and swords half the time in the left hand, step-off with the right foot first on alternate days; and all sewing, writing, use of the knife and fork, handshaking, etc., done alternately with the sinistral and the dextral hands, etc.

As to right-eyedness, left-eyedness, etc., there is a world of new facts coming to light of profound importance, medically, surgically, socially, and especially to the person abnormal in these respects. In practical ophthalmology,

"dominance" of the dextral eye in the right-handed, and the preservation of it, or reestablishment of it when lost (*vice versa* in the case of the left-handed), is of vast import, possibly to the life of many individuals. With divided or alternate dominance one of my patients was constantly making mistakes, confused, running into objects, steering his automobile into collisions, etc. (The tests are many and easily made: For instance, looking through the held-up pencil or finger at the opposite wall, an image, one image, of the pencil is seen by the dominant eye—the dextral, of course, normally, in the right-handed, the sinistral in the left-handed. If the dextral is the dominant eye, then by putting something over the left, the image will not be displaced; if the dextral eye is shut off, the image of the pencil will "jump" to the right. If the sinistral is the dominant eye, the reverse will take place.) If two images are seen, then the person has divided dominance or equidominance, and he is a patient, having confusions of mind and action which may cause accidents at any time, and which must decidedly abnormalize him in many ways. Probably equidominance is a half-way stage of the change from normal to reversed dominancy. It would be better that the right-handed should have the sinistral eye dominant (*vice versa* in the left-handed) than that he should have equidominance. I have had four patients reaching middle adult life who used one hyperopic eye solely for distance-vision (*i. e.*, for objects over about two feet away), and the other myopic eye solely for all vision in reading, writing, etc. Of course the hyperopic eye in such cases (as in one of my patients), although the left (in a right-handed person), must become the dominant eye, because dominance has existence and use only in distance-seeing.

The necessity for new terms to designate the states and functions of attention comes to view in the fact that civilization is creating a new sort of consciousness and attention. The old psychology considered that attention or consciousness was to be likened to the passing of single grains of sand through the constriction of the hour-glass. That view was

largely true, because I believe that attention is genetically and chiefly a product of vision, and that vision of the older and simpler type of eye and mind was indeed that of a continuous linear stream of single images (objects) focused one after another at the macula. But the modern mind (of the great and rapid reader, of the musician, and of men in many trades and callings) is learning to see and know and use many synchronous and coordinated images, and streams of images, both at and away from the macula. There is a growth and extension of the macular region and of its imaging, one may say, or the power of attention and consciousness is growing more and more able to receive, interpret and control the many streams (which is the same thing as the enlarged stream of sand grains), of images focused in and about the macula. Thus mental largeness, power, attention and consciousness are growing at a great rate in our complex and differentiating civilization, and the old nomenclature based upon the hour-glass comparison is no longer adequate. Especially if is added the marvelous power of the ear, as in the musician, to receive, encompass and be conscious of ten, fifty or even a hundred streams of discrete synchronous tones. The following terms may therefore be found useful:

*Right-handed.*—Preferring the dextral hand for the more expert or intellectual tasks. Whence *right-handedness*.

*Left-handed.*—Preferring the sinistral hand for the same tasks. Whence *left-handedness*.

*Right-eyed.*—Preferring the dextral eye as the dominant one.

*Left-eyed.*—Preferring the sinistral eye as the dominant one.

*Right-eared.*—Preferring the dextral ear as the one with which to hear sounds.

*Left-eared.*—Preferring the sinistral ear with which to hear.

*Right-footed.*—Choosing the dextral foot as the one to guide and base action, from which to spring in beginning to march, in spading, etc. "Step off with the left foot forward."

*Left-footed.*—The power is furnished and governed by the sinistral foot.

*Right.*—Moral, good, etc.

*Sinister.*—Unlucky, gloomy, etc.

*Dexterity.*—Expertness, agility, etc.

*Dextrous.*—Expert, agile, etc.

Because of popular usage, the four preceding may retain their vague significance in common speech, but not in science.

*Dextral.*—Pertaining to the organs on the right side of the body, regardless of expertness, preference, etc. When facing east the dextral hand is on the south side, the sinistral on the north side.

*Sinistral.*—Pertaining to the organs on the left side of the body, regardless of special preference, expertness, etc.

*Dextrality, Sinistrality.*—The corresponding abstract qualities, regardless of expertness, etc.

*Dextrad, Sinistrad.*—Toward the dextral or sinistral side of the body, respectively.

*Dextromanual, Sinistromanual.*—Pertaining, respectively, to the dextral or to the sinistral hand without regard to expertness, etc.

*Dextrocular, Sinistrocular.*—Pertaining to the eye on the dextral side, or the sinistral side, respectively, regardless of expertness, etc.

*Dextropedal, Sinistropedal.*—Pertaining to the feet, in the same way.

*Dextraural, Sinistraural.*—Pertaining to the ears, in the same way.

*Dextrocerebral, Sinistrocerebral.*—Located in the right, or the left, cerebral hemisphere, respectively.

*Ambidextral, Ambidexterity.*—Words without significance, or existence in fact, "ghost-words," which should never be used.

*Dominant Eye.*—The eye which is unconsciously and preferentially chosen to guide decision and action.

*Divided Dominance, or Equidominant Eyes.*—With shared or equal dominance.

*Alternating Dominance of the Eyes.*—Dominance of one eye at one time or for one function, alternating with that of the fellow for another time or function.

*Reversed Dominance.*—The left, because of ametropia, disease, operation, etc., of the right, becoming the dominant eye in the right-handed; or *vice versa* in the case of the left-handed.

*Dextroexpertness.*—Conjoint and superior

expertness of the dextral sensory and muscular organs of the body; the union of right-handedness, right-eyedness, right-earedness and right-footedness. The innervational centers of the more expert organs are located in the left side of the brain.

*Sinistroexpertness.*—Conjoint and superior expertness of the sinistral sensory and muscular organs of the body; the union of left-handedness, left-eyedness, left-earedness, and left-footedness. The innervational centers of the more expert organs are located in the right half-brain.

*Mixed Dextrosinistral Expertness.*—Some of the centers of the more expert organs in conjoint action are located in one, and some in the opposite half-brain. What was once meant by the really meaningless term "ambidexterity," as applied only to the hands.

*Trailing Hand, "The Trailer."*—In synchronous writing of both hands, that upon which the attention, visual or central, is not fixed.

*Visual Attention.*—That existing when the eyes consciously observe a fixed or moving object; during the act central or mental attention is fused with it.

*Central Attention.*—The "imagination," or mental remaking, of the image, by the mind or central mechanism when the peripheral visual attention is abrogated.

*Single-stream Visual Attention.*—That form of visual attention existing when the eyes follow a linear concatenation of single or unitary macular images to the exclusion of all others.

*Single-stream Central Visual Attention.*—That when the central visual attention, without objectively forming images, follows the passing of imagined single or unitary images in single file.

*Multiple Synchronous Visual Attention.*—That when the attention recognizes two or more discrete sets of retinal images at the same time—as when the musician reads several staves of music-notes, observes key-boards and pedals, the indications as to stops, tempo, expression, etc.

*Multiple Synchronous Central Visual Attention.*—The imagining or mental reproduc-

tion of multiple synchronous visual trains without the objectively formed images.

*Single-stream Auditory Attention.*—That when a monotone, a sound, or concatenation of single notes or sounds, is listened to, exclusive of others.

*Single-stream Central Auditory Attention.*—That without the objective audition.

*Multiple Synchronous Auditory Attention.*—Two or more synchronous tones or sounds, or lines of such tones or sounds, are recognized by consciousness, as in the case of the orchestra-leader who gives attention to a large number.

*Compound Synchronous Attention.*—In this the consciousness recognizes and correlates or combines multiple streams of synchronous and diverse stimuli, visual, auditory, etc. Illustrated by expert telegraphers, locomotive engineers, musicians, etc., seeing, hearing and feeling consciously at one instant.

GEORGE M. GOULD

#### COLOR VARIETIES OF LOCUSTIDÆ

IN SCIENCE for August 16, 1907, Mr. A. Franklin Shull publishes some notes on a pink form of *Amblycorypha oblongifolia* and calls attention to the rarity of records and data relating to such specimens. Mr. Shull's communication touches upon a most interesting subject that has been but little investigated, namely, the direct influence of food upon the coloration of certain phytophagous insects. The following remarks may stimulate some investigator to take up this neglected subject.

A live specimen of the pink form of *Amblycorypha oblongifolia* was recently presented to the National Museum by Dr. J. N. Rose, who captured it at the New York Botanical Garden on August 15, 1907. This specimen is perhaps the most richly colored one that has come to notice and it was captured in surroundings that suggest a derivation of this unusual coloration from food. The following descriptive notes were made from the living insect. The color is a deep rose, which could almost be called a crimson; it shows a delicate but distinct violet tinge. This violet